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Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005

T-2377

Job No.: CTCE/BBMP/W.No.09/BBU/CSR-02/777o/CEMENT/2015-16 Date: 02.03.2015

TEST REPORT ON CEMENT

* CUSTOMER	:	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY	:	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore Nort Taluk.
*NAME OF THE WORK	:	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
SAMPLE ID	:	Cement
SAMPLE RECEIVED ON	:	28.02.2015
PERIOD OF TESTING	:	28.02.2015 to 02.03.2015

The results of the tests conducted on the cement sample are as follows:

Sl. No	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 8112-2013
1	Standard Consistency	IS-4031 (Part -4) 1988(RA-2009)	28.00 %	-
2	a) Initial Setting Time	IS-4031 (Part -5) 1988(RA-2009)	155 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part -5) 1988(RA-2009)	490 Minutes	Not More than 600 Minutes
3	Soundness by Le Chartlier Method	IS-4031 (Part-3) 1988(RA-2009)	1 mm	Not more than 10mm

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****

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Job No.: CTCE/BBMP/W.No.09/BBU/CSR-02/777o/SAND-Gradation/2015-16 : 02.03.2015

TEST REPORT ON DETERMINATION GRADATION OF FINE AGGREGATES

*** Customer** : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

*** Agency** : **Mr. B.B. Umesh,**
#385, Bettaulsur (P), Bangalore Nort Taluk.

*** Name of Work** : Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015

Technical Reference : IS : 2386 Part 1 - 1963 RA-2007

Sample ID : Fine Aggregates

Sample Received on : 28.02.2015

Date of Testing : 02.03.2015

Total Wt. of Aggregates in gms **1000**

Is Sieve Size in mm	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA- 2007)			
		Zone-I	Zone-II	Zone-III	Zone-IV
10	100	100	100	100	100
4.75	93.90	90-100	90-100	90-100	95-100
2.36	73.70	60-95	75-100	85-100	95-100
1.18	52.00	30-70	55-90	75-100	90-100
600 Micron	23.60	15-34	35-59	60-79	80-100
300 Micron	11.90	5-20	8-30	12-40	15-50
150 Micron	3.40	0-10	0-10	0-10	0-15

*Information is furnished by the Customer/Representative.

Remarks : This sample is under Zone-I specific limits.

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/Gradation/2015-16 13.03.2015

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. B.B. Umesh,**
#385, Bettaulsur (P), Bangalore Nort Taluk.

Name of Work : Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015

Date of Testing : 13.03.2015

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	125	125	2.5	97.5	95-100
22.4	1475	1600	32.0	68.0	60-80
11.2	1065	2665	53.3	46.7	40-60
4.75	750	3415	68.3	31.7	25-40
2.36	615	4030	80.6	19.4	15-30
0.600	455	4485	89.7	10.3	8-22
0.075	385	4870	97.4	2.6	0-8

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/Gradation/2015-16 13.03.2015

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. B.B. Umesh,**
#385, Bettaulsur (P), Bangalore Nort Taluk.

Name of Work : Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015

Date of Testing : 13.03.2015

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	110	110	2.2	97.8	95-100
22.4	1495	1605	32.1	67.9	60-80
11.2	1240	2845	56.9	43.1	40-60
4.75	655	3500	70.0	30.0	25-40
2.36	525	4025	80.5	19.5	15-30
0.600	370	4395	87.9	12.1	8-22
0.075	415	4810	96.2	3.8	0-8

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/AIV/2015-16 13.03.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
Name of the Work	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	13.03.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	388	390	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	87	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	303	303	
4	Aggregate Impact value = percent fines	21.91	22.31	
	100* (W_2/W_1)%			22.11

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

Note:

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/S-T/2015-16 13.03.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
Name of Work	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	13.03.2015

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Result : Flakiness Index = **11.94%**

Elongation Index = **13.26%**

Result : Combined Flakiness & Elongation index 25.20%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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T-2377

Job No: CTCE/BBMP/W.No.09/BBU/CSR-02/777o/SDBC(QB)/2015-16 22.04.2015

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY	:	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore Nort Taluk.
*NAME OF THE WORK	:	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	20.04.2015
PERIOD OF TESTING	:	22.04.2015

The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	92	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	45	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	298	Min. 220

*Information is furnished by the Customer/Representative.

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/AIV/2015-16 22.04.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
Name of the Work	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	22.04.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	388	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	87	82	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	303	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	22.42	21.30	21.86

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Shape_T/2015-16 22.04.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
Name of Work	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	22.04.2015

Result : Flakiness Index = **11.85%**

Elongation Index = **13.74%**

Result : Combined Flakiness & Elongation index **25.59%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Stripping/2015-16 24.04.2015

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
Name of the work	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	24.04.2015

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.2	3.30	96.70
2	3.3		
3	3.4		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Sp_Wa/2015-16 24.04.2015

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
Name of the Work	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	24.04.2015

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2025	2027	2024	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1275	1277	1274	
4	Weight of saturated surface dry aggregate in air	W_3 g	2012	2017	2015	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	737	740	741	
6	Weight of oven dried aggregate	W_4 g	1999	2002	2000	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.712	2.705	2.699	2.706
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.761	2.761	2.755	2.759
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.65%	0.75%	0.75%	0.72%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Bitumen/2015-16 24.04.2015

BITUMEN DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC : SP : 11 - 1984

CUSTOMER	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
NAME OF THE WORK	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
SAMPLE I/D	Roads to IECHS Layout Ward No.09
DATE OF TESTING	24.04.2015

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	26.00
7. Bitumen content in %	5.00	5.20
8. Average	**5.10**	

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JAS-ANZ BSCIC ISO 9001 REGISTERED

Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Bitumen/2015-16 24.04.2015

GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS : 2386 and IRC : SP : 11 - 1984

CUSTOMER	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
NAME OF THE WORK	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
SAMPLE I/D	Roads to IECHS Layout Ward No.09
DATE OF TESTING	24.04.2015

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	26.35	5.55	5.55	94.45	90-100
4.75	258.4	54.40	59.95	40.05	35-51
2.36	52.14	10.98	70.92	29.08	24-39
1.18	48.75	10.26	81.19	18.81	15-30
0.3	27.63	5.82	87.00	13.00	9-19
0.075	37.85	7.97	94.97	5.03	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	31.56	6.66	6.66	93.34	90-100
4.75	265.3	55.97	62.63	37.37	35-51
2.36	52.47	11.07	73.70	26.30	24-39
1.18	44.12	9.31	83.01	16.99	15-30
0.3	22.69	4.79	87.79	12.21	9-19
0.075	28.74	6.06	93.86	6.14	3-8

Note:

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Building & Highway Material Testing Laboratory

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JAS-ANZ BSCIC ISO 9001 REGISTERED

Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/AGG/2016-17 24.04.2015

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore North Taluk.
Name of the Work	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	24.04.2015

Total Weight of Sample: **5350** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	425	7.9	7.94	92.06	90-100	
4.75	2855	53.4	61.31	38.69	35-51	
2.36	650	12.1	73.46	26.54	24-39	
1.18	475	8.9	82.34	17.66	15-30	
0.3	355	6.6	88.97	11.03	9-19	
0.075	290	5.4	94.39	5.61	3-8	

Total Weight of Sample: **5250** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	315	6.0	6.00	94.00	90-100	
4.75	2685	51.1	57.14	42.86	35-51	
2.36	615	11.7	68.86	31.14	24-39	
1.18	440	8.4	77.24	22.76	15-30	
0.3	435	8.3	85.52	14.48	9-19	
0.075	470	9.0	94.48	5.52	3-8	

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JAS-ANZ BSCIC ISO 9001 REGISTERED

Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Stability/2015-16 24.04.2015

TEST REPORT ON STABILITY OF MIX

Customer	:	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	:	**Mr. B.B. Umesh,** #385, Bettaulsur (P), Bangalore Nort Taluk.
Name of the Work	:	Improvements to IECHS Layout roads in Ward No.09, Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	:	EE/BTP/BBMP/E-PMT/10(16721)WO/72/2015-16 Dated: 06.05.2015
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Semi Dense Bituminous Concrete
Date of Testing	:	24.04.2015

The results of the tests conducted on the Semi Dense bituminous concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-16)
1	Marshal Stability, Kn	10.15	9.45	8.2 Kn (min)
2	Marshal flow, mm	3.45	3.20	2 – 4
3	Percent air voids in Mineral Aggregate	3.20	3.45	3 – 5
4	Voids in Compacted Mix	13.45	13.30	13 – 15
5	Percent Voids filled with Bitumen	67.50	68.75	65 - 78
6	Density, g/cc	2.27	2.26	--

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Note:

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